

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A Schottky barrier diode comprising:
 - a substrate region of a first conductivity type formed underneath a semiconductor material layer of the same conductivity type;
 - a metal layer; and
 - at least two doped regions of a second conductive type formed in said semiconductor material layer, each one of said doped regions being disposed under said metal layer and being separated from the other doped region and said substrate region by portions of said semiconductor layer,wherein said doped regions are optimally doped to equalize the charge in said semiconductor material layer so that the electric field upon the entire volume of said semiconductor material layer is constant and also equal to [[the]] a critical electric field of said semiconductor material layer.
2. (Original) The Schottky barrier diode according to claim 1, in which said semiconductor material layer comprises a first resistivity value, and said doped regions each comprise a second resistivity value, wherein said second resistivity value is higher than said first resistivity value.
3. (Original) The Schottky barrier diode according to claim 1, in which said substrate comprises a doping value higher than a doping value of said semiconductor material layer.
4. (Original) The Schottky barrier diode according to claim 1, in which said doped regions further comprise respective body regions.
5. (Cancelled)
6. (Previously Presented) The Schottky barrier diode according to claim 1, in which said doped regions further comprise heavily doped body regions having the same conductivity type of said doped regions.

7. (Original) The Schottky barrier diode according to claim 1, in which said semiconductor material layer comprises a resistivity value lower than five Ohm-cm for a breakdown voltage higher than 200V.
8. (Original) The Schottky barrier diode according to claim 1, in which said doped regions comprise P-type doped regions.
9. (Original) The Schottky barrier diode according to claim 1, in which said semiconductor material layer comprises an N-type semiconductor material layer.
10. (New) The Schottky barrier diode according to claim 1, in which said Schottky barrier diode is operational at a voltage of 500V.
11. (New) The Schottky barrier diode according to claim 1, in which said Schottky barrier diode is operational at a voltage of 600V.
12. (New) The Schottky barrier diode according to claim 1 further comprising a silicide layer formed over the surface of the semiconductor material layer.
13. (New) The Schottky barrier diode according to claim 1 in which at least one of the doped regions is in an active area of said Schottky barrier diode and at least one of the doped regions is in an edge area of said Schottky barrier diode.
14. (New) A Schottky barrier diode comprising:
 - a substrate region of a first conductivity type formed underneath a semiconductor material layer of the same conductivity type;
 - a metal layer; and
 - at least two doped regions of a second conductive type formed in said semiconductor material layer, each one of said doped regions being separated from the other doped region and said substrate region by portions of said semiconductor layer,
 - wherein at least one of the doped regions is in an active area of said Schottky barrier diode and at least one of the doped regions is in an edge area of said Schottky barrier diode.

15. (New) The Schottky barrier diode according to claim 14, in which said semiconductor material layer comprises a resistivity value lower than five Ohm-cm for a breakdown voltage higher than 200V.
16. (New) The Schottky barrier diode according to claim 14, in which said Schottky barrier diode is operational at a voltage of 600V.
17. (New) The Schottky barrier diode according to claim 14 further comprising a silicide layer formed over the surface of the semiconductor material layer.
18. (New) A Schottky barrier diode comprising:
 a substrate region of a first conductivity type formed underneath a semiconductor material layer of the same conductivity type;
 a metal layer; and
 at least two doped regions of a second conductive type formed in said semiconductor material layer, each one of said doped regions being disposed under said metal layer and being separated from the other doped region and said substrate region by portions of said semiconductor layer,
 wherein said at least two doped regions are placed in an active area of said Schottky barrier diode and at least another doped region of a second conductivity type is formed in said semiconductor material layer in an edge area of said Schottky barrier diode.
19. (New) The Schottky barrier diode according to claim 18, in which said semiconductor material layer comprises a resistivity value lower than five Ohm-cm for a breakdown voltage higher than 200V.
20. (New) The Schottky barrier diode according to claim 18, in which said Schottky barrier diode is operational at a voltage of 600V.
21. (New) The Schottky barrier diode according to claim 18 further comprising a silicide layer formed over the surface of the semiconductor material layer.